

Name: _____ Period: _____ Date: _____

Matrix Multiplication, Inverses, and Determinants Bell Work

Determine whether given matrices in each case are inverses of each other or not.

1. $A = \begin{bmatrix} 7 & -4 \\ -5 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 4 \\ 5 & 7 \end{bmatrix}$

2. $A = \begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}$

Matrix Multiplication, Inverses, and Determinants Bell Work**Answers**

Determine whether given matrices in each case are inverses of each other or not.

1. $A = \begin{bmatrix} 7 & -4 \\ -5 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 4 \\ 5 & 7 \end{bmatrix}$

$$AB = \begin{bmatrix} 7(3) + (-4)(5) & 7(4) + (-4)(7) \\ -5(3) + 3(5) & -5(4) + 3(7) \end{bmatrix}$$

$$AB = \begin{bmatrix} 21 - 20 & 28 - 28 \\ -15 + 15 & -20 + 21 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$BA = \begin{bmatrix} 3(7) + 4(-5) & 3(-4) + 4(3) \\ 5(7) + 7(-5) & 5(-4) + 7(3) \end{bmatrix}$$

$$BA = \begin{bmatrix} 21 - 20 & -12 + 12 \\ 35 - 35 & -20 + 21 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Since $AB = BA = I$

→ **A and B are inverses of each other.**

2. $A = \begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}$

$$AB = \begin{bmatrix} 3(1) + 2(4) & 3(2) + 2(3) \\ 4(1) + 1(4) & 4(2) + 1(3) \end{bmatrix}$$

$$AB = \begin{bmatrix} 3 + 8 & 6 + 6 \\ 4 + 4 & 8 + 3 \end{bmatrix} = \begin{bmatrix} 11 & 12 \\ 12 & 11 \end{bmatrix}$$

$$BA = \begin{bmatrix} 1(3) + 2(2) & 1(2) + 2(1) \\ 4(3) + 3(4) & 4(2) + 3(1) \end{bmatrix}$$

$$BA = \begin{bmatrix} 3 + 4 & 2 + 2 \\ 12 + 12 & 6 + 3 \end{bmatrix} = \begin{bmatrix} 7 & 4 \\ 24 & 9 \end{bmatrix}$$

Since $AB \neq BA \neq I$

→ **A and B are not the inverses of each other.**